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3.3 Variable ordering structures – what can be assumed?

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In some real-world applications in multi-objective optimization it cannot be assumed that
there is a partial ordering in the image space, i.e. that there exists a binary relation which is
reflexive, transitive and compatible with the linear structure of the space. Instead, preferences
may vary depending on the current information. This can be modeled by an ordering map
which associates sets of improving (or deteriorating) directions with each element of the
image space or of the pre-image space. Depending on the point of view (i.e. preference or
domination) different optimality concepts are discussed in the literature. In this talk we
give some motivating applications and a basic introduction to this topic. We present the
various ways given in the literature to model a variable ordering structure and the different
optimality concepts which are derived. We collect some basic properties which are often
assumed for obtaining theoretical and numerical results. Limitations of the current concepts
are also pointed out. This talk aims to be the base for a discussion on how variable ordering
structures can be modeled, which assumptions on an ordering map seem to be reasonable,
and which optimality concepts are considered to be most practically relevant.